

Claims

[c1] Having just described the aforementioned invention, we claim:

1. A navigational device for providing a diver access to global positioning system position information, said navigational device comprising:
 - a. a flotation device having sufficient positive buoyancy to support said navigational device above a water surface
 - b. a watertight capsule with transparent window for encasing a gps receiver
 - c. a waterproof signal conducting cable for tethering said flotation device to said watertight capsule such that said cable is adapted to extend generally vertically in a column of water between said flotation device and said watertight capsule.

[c2]

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2. A navigational device, as described in claim 1, wherein said flotation device comprises:
 - a. a flotation device of positive buoyancy so as to support said navigational device above said water surface
 - b. a watertight module for housing a radio signal antenna
 - c. said watertight module also housing a power supply
 - d. a platform for supporting said watertight module a distance above said flotation device
 - e. means for attaching said platform to said flotation device
 - f. means for attaching said platform to said watertight module while maintaining the watertight nature of said module
 - g. a ballast located so as to stabilize said navigational device in an upright position while deployed on said water surface
 - h. an enclosure for housing a length of said waterproof signal conducting cable of claim 1.
 - i. said flotation device having an orifice in said cable enclosure whereby lengths of said waterproof cable can be released and retracted through said orifice
 - j. a means for connecting said flotation device to one end of said signal cable and said watertight capsule to the distal end of said signal cable.

[c3]

3. Said flotation device of claim 2 having a cable-reel for maintaining

organization of said waterproof signal cable enclosed in said cable enclosure, said cable-reel comprising:

- a. a spool in which said signal cable is wound and un-wound when said cable is released and retracted from a body of water
- b. said spool having means as to provide self-winding capability
- c. said spool having means as to provide constant and consistent minimal tension on said cable during decent and ascent, as to maintain the least amount of slack between said floatation device and said watertight capsule
- d. said cable-reel of sufficient capacity as to support cable lengths of over 40 meters
- e. means of attaching said cable-reel to said cable enclosure
- f. means of attaching said signal cable to said cable-reel.

[c4]

4. A navigational device as described in claim 1, wherein said watertight capsule comprises:

- a. a watertight plastic capsule including a body having one closed end and one open end, and a lid for sealing said open end
- b. an o-ring positioned between said capsule's open end and said lid for forming a watertight seal between said capsule and said lid
- c. a plurality of watertight spring-loaded latches for compressing said o-ring between said capsule and said lid for creating a watertight seal
- d. a watertight cable pass-through for inserting said waterproof cable into said watertight capsule, said cable pass-through having means of insuring the watertight seal of the capsule
- e. a plurality of user interface buttons allowing the diver to interface with said gps receiver while submerged
- f. a magnifying optical lens integrated in a sector of said watertight capsule for enhanced viewing of a gps receiver display.

[c5]

5. The navigational device of claim 4, wherein said gps receiver is a global positioning system signal processor for determining where on the surface of the earth the navigational device is located.

[c6]

6. A navigational device as described in claim 5, where said gps receiver comprises:

- a. a global positioning system receiver having means to utilize wide area augmentation system, and differential global positioning system data
- b. a means for attaching said antenna to said gps receiver while maintaining signal continuity
- c. an internal renewable power source
- d. a plurality of user interface buttons allowing said diver to input data into the gps receiver
- e. a watertight housing having a display face
- f. said display face having means for visually indicating the current location of said gps receiver
- g. said gps receiver having means for graphically displaying in real-time the geographic position of said gps receiver on the earth's surface
- h. said gps receiver having means for illuminating said display face for enhanced viewing by a diver at night or during low visibility
- i. said gps receiver having means for graphically displaying a plurality of position indicating elements on said display face.

[c7]

7. A navigational device, as described in claim 1, wherein said signal conducting cable comprises:

- a. a signal conducting cable in signal conducting relationship with said antenna and said gps receiver
- b. said signal cable being capable of transmitting radio frequency signals
- c. a length of said signal carrying cable
- d. said signal cable having means of electrically carrying the gps signal acquired and transmitted by said antenna
- e. said signal cable having an impedance of approximately 50 ohms
- f. said signal cable having a waterproof outer coating
- g. said signal cable having a distal end opposite from said antenna, further comprising said watertight capsule attached to said distal end for transmitting and receiving signals.

[c8]

8. A navigational device, as described in claim 2, wherein said watertight

module comprises:

- a. a radio signal receiving antenna
- b. an electrical circuit means within said housing, providing a power supply for said active antenna
- c. a power source
- d. said power source comprising a battery operatively connected to a on/off switch for energizing and de-energizing said circuit means
- e. said watertight module having a space of sufficient size to house said antenna
- f. said watertight module having a space of sufficient size to also house said power source
- g. said watertight module having a transparent lid as to allow un-hindered radio signal reception by said gps antenna
- h. said watertight module having means to secure said transparent lid to said case
- i. said watertight module having means as to secure said housing and said lid in a fashion as no water is allowed to enter.

[c9]

9. The navigational device of claim 2 wherein said antenna is a receiver responsive to signals generated by global positioning system satellites.

[c10]

10. A navigational device, as described in claim 8, wherein said electrical circuit includes:

- a. a means for regulating voltage
- b. a means for blocking said gps signal from said power source
- c. a means for filtering high frequency noise
- d. a means of filtering radio frequency noise
- e. a means for maintaining a consistent approximately 50-ohm impedance path.

[c11]

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11. A method for facilitating navigation for a diver underwater to navigate between locations, comprising:

- a. a means for identifying the current geographical position
- b. a means for marking additional geographic location after moving a

distance

c. a means for utilizing gps location data, visually displayed, to navigate between the recorded position markings.

[c12]

12. A navigational device for providing global positioning system location information to an underwater diver, said navigational device comprising:

a. a flotation device having sufficient positive buoyancy to float on a water surface while supporting said navigational device

b. a watertight capsule with transparent window, for encasing a gps receiver

c. a signal conducting cable for tethering said flotation device to said watertight capsule such that said cable is adapted to extend generally vertically in a column of water between said flotation device and said watertight capsule.

[c13]

13. A navigational device, as described in claim 12, wherein said flotation device comprises:

a. a flotation ring of positive buoyancy so as to support said navigational device above said water surface

b. a watertight module for encasing an antenna

c. said watertight module also encasing a power supply

d. a platform for supporting said watertight module a distance above said flotation device

e. means for attaching said platform to said flotation device

f. means for attaching said watertight module to said platform while maintaining the watertight nature of said module

g. a ballast located so as to stabilize said navigational device in an upright position while deployed on a water surface.

h. a means for connecting said flotation device to one end of said signal cable and said watertight capsule to the distal end of said signal cable.

[c14]

14. A navigational device as described in claim 12, wherein said watertight capsule comprises:

a. a capsule including means for enclosing a gps receiver so as to protect

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said gps receiver from water and pressure damage

b. a watertight cable pass-through for connecting said waterproof cable to said watertight plastic capsule whereby maintaining capability of insuring the watertight seal of the module

c. a plurality of user interface buttons integrated in a sector of said watertight capsule, for allowing the diver to interface with said gps receiver while submerged

d. a magnifying optical lens integrated in a sector of said watertight capsule for enhanced viewing of said gps receiver display.

[c15]

15. The navigational device of claim 14, wherein said gps receiver is a global positioning system signal processor for determining where on the surface of the earth the navigational device is located.

[c16]

16. The navigational device as described in claim 15, where said gps receiver comprises:

a. a global positioning system receiver having means to utilize wide area augmentation system, and differential global positioning system data

b. a means for attaching said antenna

c. an internal rechargeable power source

d. a plurality of user interface buttons allowing said diver to input data into the gps receiver

e. a watertight housing having a display face

f. said display face having means for visually indicating the current location of said gps receiver

g. a means for graphically displaying on said display face, the geographic movement of said gps receiver

h. a means for illuminating said display face for enhanced viewing by a diver at night or during low visibility

i. means for graphically displaying a plurality of position indicating elements on said display face.

[c17]

17. A navigational device, as described in claim 12, wherein said signal conducting cable comprises:

- a. a signal carrying cable of some length
- b. said signal conducting cable in signal conducting relationship with said antenna and said gps receiver
- c. said signal cable having means of transmitting radio frequency signals
- d. said signal cable having means of electrically carrying the gps radio signal
- e. said signal cable having an impedance of approximately 50 ohms
- f. said signal cable having a waterproof outer coating
- g. said signal cable having a distal end opposite from said antenna, further comprising said watertight capsule attached to said distal end for housing said gps receiver.

[c18]

18. a navigational device, as described in claim 13, wherein said watertight module comprises:

- a. a radio signal antenna capable of receiving wide area augmentation system and differential global positioning system signals
- b. a electrical circuit means
- c. a power source
- d. said power source comprising a batter operatively connected to said on/off switch for energizing and de-energizing said circuit means
- e. said watertight module being of sufficient size as to house said power supply and said antenna
- f. said watertight module having a transparent lid as to permit said antenna unhampered access to gps satellite signals
- g. said watertight module having means to secure said transparent lid to said case in a fashion which maintains a watertight seal between said lid and said case.

[c19]

19. A navigational device, as described in claim 18, wherein said electrical circuit includes:

- a. a means for regulating voltage
- b. a means for blocking said gps signal from said power source
- c. a means for filtering high frequency noise
- d. a means of filtering radio frequency noise

e. a means for maintaining a consistent approximately 50-ohm impedance path between said antenna and said gps receiver.

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